Issued May 6, 1914.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE STATE OF INDIANA, DEPARTMENT OF GEOLOGY;
EDWARD BARRETT, STATE GEOLOGIST.

SOIL SURVEY OF MONTGOMERY COUNTY, INDIANA.

BY

GROVE B. JONES, OF THE U. S. DEPARTMENT OF AGRICULTURE,
AND C. H. ORAHOOD, OF THE INDIANA DEPARTMENT
OF GEOLOGY.

J. E. LAPHAM, INSPECTOR IN CHARGE NORTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1912.]

WASHINGTON:
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1914.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., June 24, 1913.

SIR: The accompanying report and soil map cover the survey of Montgomery County, Ind., one of the projects undertaken by the bureau during the field season of 1912. This work was done in cooperation with the State of Indiana and the selection of this area was made after conference with State officials.

I recommend the publication of this report and map as advance sheets of Field Operations of the Bureau of Soils for 1912, as provided by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

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SOIL SURVEY OF MONTGOMERY COUNTY, INDIANA.

By GROVE B. JONES, of the U. S. Department of Agriculture, and C. H. ORAHOOD, of the Indiana Department of Agriculture.

DESCRIPTION OF THE AREA.

Montgomery County, Ind., is situated in the west-central part of the State. It is bounded on the north by Tippecanoe County; on

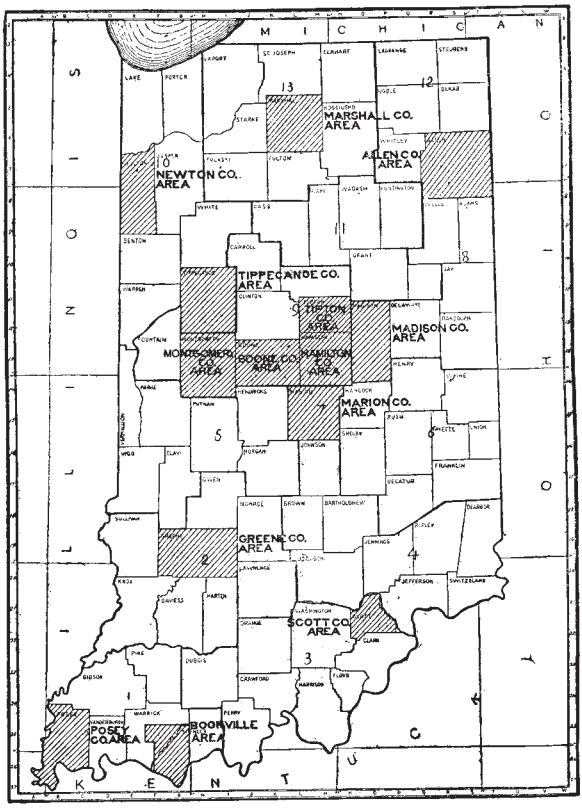

FIG. 1.—Sketch map showing location of the Montgomery County area, Indiana.

the east by Clinton, Boone, and Hendricks Counties; on the south by Putnam and Parke Counties; and on the west by Parke and Fountain Counties. It has an area of 501 square miles or 320,640 acres.

The county is divided into two nearly equal parts by Sugar Creek, formerly known as Rock River, the largest stream within its boundaries. This stream enters the county from the east about 5 miles south of the northern boundary and leaves the county about 5 miles north of the southern boundary. Its tributaries from the north are Lye and Black Creeks and from the south Walnut Fork and Offield and Indian Creeks. The extreme southern and southeastern parts of the survey are drained by the Raccoon Creeks and Cornstalk Creek; the northwest part by the branches of Coal Creek, a stream emptying directly into the Wabash River.

The topography is in general a plain, dissected into moderately hilly country in places and smooth elsewhere. Probably the highest elevation in the county is to be found in the vicinity of Alamo, where the maximum elevation is approximately 870 feet. Other elevations of considerable height are found north of Yountsville. One point, known as "Bald Hill," rises to a height of 190 feet above Sugar Creek. In general the surface varies between 700 and 850 feet above sea level.

The largest level area in the county, geologically known as ancient Lake Harney, lies in the south-central part, and until reclaimed by artificial drainage was called Black Swamp. The surface of this entire area presents but slight variation in elevation. A strip of prairie land from 1 mile to nearly 5 miles wide, gently undulating in character but broken by occasional wooded areas, extends entirely across the northern part of the county.

From its point of entrance into Montgomery County to about 2 miles below Yountsville, Sugar Creek has a valley of considerable width, consisting of bottom or overflow land and terraces at varying elevations. Below this point the valley is contracted by precipitous bluffs, many of which are bare rocky cliffs from 100 to 200 feet or more in height. Numerous springs give rise to streams which have reduced the country for nearly a mile on either side of Sugar Creek to a network of deep gullies and steep slopes, for the most part unsuited for cultivation. The accompanying soil map is not a topographic sheet, and since it does not show the elevations it is difficult to get a correct idea of the unevenness of this section of Montgomery County.

Montgomery County was organized in 1823, and the town of Crawfordsville, situated in the central part, founded. As the country was settled Crawfordsville became an important business point. It was incorporated as a city in 1865, and to-day is the county seat, with a population of about 10,000. Several manufacturing industries are located here. Crawfordsville is also the site of Wabash College, organized in 1832. Ladoga, situated in the southeastern part of the county, is second in size, with a population of about 1,200. Here is

located the only canning factory at present in the county. Waveland affords an outlet for the produce of the southwestern part of the county, while Darlington, Linden, New Richmond, Wingate, Waynetown, Kirkpatrick, and Alamo are thriving market towns, supplying the communities in which they are located.

The system of consolidated schools has recently been introduced. Modern commodious structures advantageously situated have displaced the more numerous small schoolhouses. The system is said to be satisfactory.

The roads throughout the county are as a rule in good condition, most of them being graveled. During the last few years some have been macadamized, and each year the mileage is increased.

The county is well supplied with steam and electric roads. Three railroads pass through Crawfordsville, the New York Central and Pennsylvania systems and the Chicago, Indianapolis & Louisville Railway. The Toledo, St. Louis & Western crosses the northern part of the county, passing through Wingate, New Richmond, Linden, and Kirkpatrick. In the southern part of the county the Central Indiana Railway connects Waveland and Ladoga with Lebanon in Boone County.

Crawfordsville is also the terminus of two electric lines. The Indianapolis, Crawfordsville & Western (Ben Hur route) extends southeast, connecting the county directly with Indianapolis. The Terre Haute, Indianapolis & Eastern Traction Co. line, known as the Northwestern, runs east to Lebanon and other points. It is planned to extend this line west from Crawfordsville, connecting it with Danville, Ill. The construction of a system of spurs into parts of the county not at present served with transportation facilities will be welcomed. Alamo and vicinity will be especially benefited.

CLIMATE.

The tables following give the records of the Weather Bureau stations at La Fayette and Veedersburg, in counties adjoining Montgomery on the north and west, respectively. No means have been established for Crawfordsville, nor is there any station in the county with satisfactory records. The data compiled from the two stations mentioned are, however, applicable to local conditions.

The climate of Montgomery County is humid. It is characterized by wide variations in temperature. The mean annual precipitation, taking the mean of the records of the La Fayette and Veedersburg stations, is 36.43 inches and is favorably distributed through the year.

The average snowfall recorded at La Fayette covering a period of 22 years, is 22.8 inches, which under normal conditions is sufficient to protect winter wheat, rye, and clover seedings.

Normal monthly, seasonal, and annual temperature and precipitation at La Fayette, Tippecanoe County.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	29.7	69	−17	2.59	1.95	5.84	3.5
January	25.3	70	−33	2.47	1.18	0.40	7.0
February	26.9	69	−26	2.75	2.94	5.78	6.3
Winter	27.3	.....	.....	7.81	6.07	12.02	16.8
March	37.6	83	− 5	3.20	1.41	3.30	4.4
April	50.5	89	10	3.27	2.94	2.25	0.4
May	61.5	97	25	4.40	2.11	3.82	Trace
Spring	49.9	.....	.....	10.87	6.46	9.37	4.8
June	70.7	100	33	4.43	1.97	7.16	0.0
July	74.6	105	42	3.77	0.88	2.05	0.0
August	72.6	102	39	3.23	3.08	0.47	0.0
Summer	72.6	.....	.....	11.43	5.93	9.68	0.0
September	66.1	101	29	2.77	3.02	4.20	0.0
October	53.3	92	16	2.35	1.62	4.42	Trace
November	39.5	95	− 1	3.06	3.72	6.49	1.2
Fall	53.0	.....	.....	8.18	8.36	15.11	1.2
Year	50.7	105	−33	38.29	26.82	46.18	22.8

Average date of first killing frost in autumn, Oct. 5; of last in spring, Apr. 26. Earliest date of killing frost in autumn, Sept. 14; latest in spring, May 27.

Normal monthly, seasonal, and annual temperature and precipitation at Veedersburg, Fountain County.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	31.0	62	−12	2.17	3.20	0.43	.....
January	27.3	69	−24	2.34	1.34	0.43	.....
February	25.1	64	−14	1.91	1.39	2.65	.....
Winter	27.8	.....	.....	6.42	5.93	3.51	.....
March	42.9	84	− 6	3.20	3.78	3.18	.....
April	51.2	88	20	2.23	2.13	0.69	.....
May	63.1	94	23	4.33	2.68	5.80	.....
Spring	52.4	.....	.....	9.76	8.59	9.67	.....

Normal monthly, seasonal, and annual temperature and precipitation at Veedersburg, Fountain County—Continued.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow average depth.
	°F.	°F.	°F.	Inches.	Inches.	Inches.	Inches.
June	70.3	97	36	4.97	7.98	9.06	.....
July	75.3	105	42	3.51	0.39	6.46	.....
August	74.0	101	44	3.29	4.40	3.87	.....
Summer	73.2	.....	.....	11.77	12.77	19.39	.....
September	68.7	97	31	2.23	T.	2.19	.....
October	57.0	90	20	2.27	4.45	3.30	.....
November	41.6	78	7	2.12	0.98	3.43	.....
Fall	55.8	.....	.....	6.62	5.43	8.92	.....
Year	52.3	105	−24	34.57	32.72	41.49	.....

Average date of first killing frost in autumn, Oct. 5; of last in spring, May 1. Earliest date of killing frost in autumn, Sept. 14; latest in spring, May 21.

Records of frost occurrence at Crawfordsville give the average date of last killing frost in spring as April 24 and of first in fall as October 20. There are thus 189 days free from frost of sufficient severity to injure even tender plants. The season is ample for the maturing of the principal crop, corn.

AGRICULTURE.

In Montgomery County agriculture is the principal resource. It dates back to 1823, when the first settlement was made on a high bluff overlooking Sugar Creek, at what was destined to be Crawfordsville. The development of agriculture was slow, for nearly all the county was originally forested with hickory, oak, elm, maple, beech, and walnut.

Corn was the first crop grown, but was later planted in alternation with wheat. Wheat for a long time was extensively grown, but for nearly a score of years there has been a rapid falling off in wheat production.

Formerly stock raising was a leading industry, as the soils are nearly all adapted to the growing of grasses, the native bluegrass and prairie grass of the northern section of the county affording ample grazing for large herds of cattle. At present, however, only a few head of cattle are fed on most of the farms and more attention is paid to the raising of hogs. The present high prices of beef and pork, it would seem, should stimulate the development of these forms of animal husbandry.

The raising of sheep was once extensively carried on and there are still some flocks in nearly all parts of the county. The rough areas in the southwestern part of the county are well adapted to sheep raising.

At the present time the farmers of Montgomery County are devoting most of their attention to growing corn, hay, oats, wheat, and rye, and, to a limited extent, millet, alfalfa, truck crops, and tomatoes for canning purposes.

The growing of alfalfa is in its infancy in Montgomery County, but it can be grown with profit; a few farmers recognize this fact and are taking advantage of it. Its importance as a feed, especially for dairy cows, and as a soil renovator are generally appreciated. Alfalfa is usually difficult to start, and for this reason many farmers become discouraged. Alfalfa is successfully grown on a small scale on a number of soil types, but failures have been made in attempting to seed this crop on these same soils in other parts of the county. As a general rule it is difficult to introduce any new crop into a region where farming is well established along fixed lines, and when the attempt is made and attended by no pronounced success there is no disposition to give the crop another trial.

For the production of alfalfa the soil should be well drained, liberally supplied with lime and barnyard manure, and reduced to the best physical condition. Inoculation may be necessary, although it is not always so, especially where sweet clover grows. Soil from a field where alfalfa has grown successfully may be used for this purpose. Weeds are inclined to crowd alfalfa out, and only by frequent cutting can they be kept back.

About 20 pounds of alfalfa seed per acre is sown without a nurse crop in August or September, or it may be seeded in the spring with oats. The introduction of alfalfa into the rotation would be of great value. Besides adding nitrogen to the soil the subsoil is loosened by the roots, which penetrate to great depths.

Corn is grown extensively over the entire area, and it is the most important crop. A few silos are in use by the dairies around Crawfordsville, and their number is gradually increasing. Late corn and corn planted for ensilage form excellent feed for both dairy and market cattle. Oats are grown extensively, and the acreage devoted to rye is being increased.

The growing of tomatoes for canning has assumed large proportions in the vicinity of Ladoga, where the only canning factory in the county is located. From 125 to 250 bushels per acre are generally obtained, and 20 cents a bushel is the average price paid. As the canning industry grows, other canning crops, such as sweet corn and peas, will doubtless be produced.

The trucking industry has not been extensively developed. A number of gardens in the vicinity of Crawfordsville supply that local market. Strawberries, tomatoes, cabbage, melons, cantaloupes, lettuce, and cucumbers are grown successfully. This industry could be profitably extended, especially upon the sandy loams.

Other special crops could be profitably grown on many of the soils. Muck is well suited to the production of celery, lettuce, cabbage, and carrots, and sugar beets are grown farther north on soils similar to those existing in the county.

Conditions are favorable for dairying. The product of the several existing dairies is at present consumed within the county, but there appears to be no reason why a surplus for export should not be produced.

The agriculture of the area is highly developed and the crops which are being grown are well adapted to the soils and general conditions. The general appearance of the farms indicates a high average condition of thrift and prosperity. The farm buildings as a rule are well built and substantial, and many are equipped with modern improvements.

About 60 per cent of the farms are operated by the owners. There is thus considerable tenant farming. Both cash and share systems of renting are practiced. When rented for cash farm lands bring from $3 to $6 an acre. The more common plan of rental is on a share basis, the landlord receiving one-half of the products. The tenant often pays a cash consideration, usually designated the "privilege," for use of house, barn, garden, and pasture. Thrashing expenses are usually equally divided. Many landowners rent their farms to tenants and live in the towns and villages.

The value of farm lands in the county varies from $15 to $50 an acre for Steep broken land to $200 an acre for well-improved "black land" (Clyde and Carrington soils). Values have advanced sharply in the last few years.

The light-colored soils of the county are in need of organic manures. The black soils are well supplied with organic matter, but frequently are more or less acid, and some form of lime, such as pulverized limestone, should be applied. On such soils phosphoric acid is also often beneficial.

On the whole, fairly good cultural methods are practiced in handling soil, but in many cases crop yields may be increased by deeper plowing, more frequent cultivation, and systematic rotations. The importance of crop rotation is recognized and some system generally followed, though a greater proportion of the land might be kept in clover to good advantage.

There is need of improving the drainage conditions on the Clyde silty clay loam and the Miami silt loam, flat phase.

SOILS.

Montgomery County lies within that portion of the glaciated region covered by the later or Wisconsin ice sheet. This great ice sheet deposited a mantle of unconsolidated material which now in a more or less modified condition constitutes the soil.

The bedrock beneath this mantle consists of many thin strata of shale, sandstone, and limestone, which have been classed as regards age with the Lower Carboniferous. These rocks are so deeply covered by the unconsolidated glacial drift that they are nowhere exposed in the county in sufficient extent to weather into distinct residual soils and only slightly influence the composition of the glacial soils, as the débris of local derivation makes up only a small proportion of the drift. The varying degrees of hardness of the several strata have, however, determined the character of the topography to some extent, as shown by preglacial valleys and by valleys eroded since glacial times. These rocks have contributed to the industries of the region some materials of economic importance.

The agency of the ice flow in influencing topography is to be seen among other things in altered stream courses. The present course of the deeply intrenched valley of Sugar Creek, beginning a few miles west of Crawfordsville and a short distance north of Yountsville, indicates conclusively its recent origin. Before becoming obstructed it is thought that the outlet for Sugar Creek was by means of two channels, one leading more directly to Coal Creek, the other to the southwest of Yountsville. Lye Creek is believed to have also occupied a preglacial valley.

Ancient Lake Harney, a preglacial lake several miles in extent, is found south of New Market. Its bed was known to the early settlers as "Black Swamp."

The covering of the unconsolidated material varies in depth in different parts of Montgomery County from a few inches over the Steep broken land to 100 feet or more as a maximum. The till consists of a heterogenous mass of sand, gravel, clay, and bowlders at lower depths, but as a rule the surface covering is more homogeneous over considerable areas and has weathered into fairly uniform types of soil. Occasional large bowlders, apparently dropped promiscuously, are a feature of the landscape. A train of these bowlders, one-fourth to one-half mile wide, extends across the northeastern part of the county. The bowlders consist for the greater part of crystalline rocks.

The glacial drift is overlain almost everywhere by a mantle of silty material. Hills, slopes, and valleys alike have this silt covering which varies in depth from a few inches to nearly 3 feet.

The Miami silt loam is the most extensively developed soil type. The material of the surface soil or of the surface soil and the upper subsoil appears to be closely related to the silt, while that of the subsoil or lower subsoil is glacial till.

The Miami silt loam, flat phase, represents the weathered product of the glacial till over gently undulating or nearly level areas.

The Carrington silt loam is composed of drift material weathered under conditions of poor drainage that have produced a dark-colored surface soil.

The Clyde silty clay loam has been produced where till and loessial material have weathered under poor drainage conditions, favorable to the accumulation of organic matter. It has also been modified to some extent by the washing in of silty material from the higher lands.

Two terrace soils are found in the county, the Fox silt loam and the Fox sandy loam. Both contain gravel which increases in quantity with depth. The types represent reworked glacial material deposited when the stream flowed at a higher level than at present.

The Rodman gravelly sandy loam is found occupying morainic hills and ridges.

The soils of the Genesee series and Meadow represent recent alluvium.

The following table gives the name and extent of the several soils mapped in the county:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Miami silt loam	168,960	63.6	Fox silt loam	3,520	1.1
Flat phase	34,944		Fox sandy loam	1,664	.5
Clyde silty clay loam	46,400	14.5	Muck	1,600	.5
Carrington silt loam	34,816	10.9	Rodman gravelly sandy loam	576	.1
Meadow	14,080	4.4			
Genesee fine sandy loam	9,088	2.8	Total	320,640	.....
Steep broken land	4,992	1.6			

MIAMI SILT LOAM.

The surface soil of the Miami silt loam consists of a light-brown silt loam about 10 to 15 inches deep. In some localities a small quantity of pebbles or gravel and occasionally some cobblestones and bowlders are found, but the distribution is not general.

The subsoil to a depth of about 30 inches is a yellowish-brown heavy silt loam to silty clay loam, where the glacial drift material is usually encountered. This bowlder till closely resembles the lower subsoil of the flat phase of the type and consists of a brown to slightly

reddish brown sandy clay or clay loam. Below 3 feet gravel, cobbles, and bowlders become more numerous.

There are a few included patches too small to map in which the texture tends to loam or fine sandy loam, particularly on some of the knolls and slopes.

The Miami silt loam is the most extensive soil in the county. For the most part it occupies rolling country, although there are a few morainic hills and some nearly level areas. In the vicinity of Alamo the topography is billowy, and the surface soil in this region and around Waynetown and east to Wesley Chapel in general contains a larger percentage of medium and coarse sand than is typical.

The Miami silt loam consists of the finer grades of glacial drift material modified more or less by the addition of what appears to be loessial material. In some localities the effect of wind action upon the material is quite apparent.

Where the type occupies level to undulating areas, there is a close resemblance to the flat phase of the type. The likeness, however, is found in the subsoil, which is more compact and has the characteristic mottling of gray and yellow. This condition is due to immature drainage and poor aeration. In these areas the surface soil has a brown color, while the flat phase under similar conditions is light gray to whitish.

The natural drainage of the Miami silt loam is in most places good, and only in a few localities is artificial drainage practiced. The type is locally known as "sugar-tree land" on account of the predominance of the hard maple on such areas. Besides maple, oak, hickory, walnut, and beech are abundant.

The type is a typical general-purpose soil. All the farm products common to this region are grown successfully. As in the case of the other soils of the county, the principal crop is corn, with yields ranging from 40 to 70 bushels per acre. The acreage of oats is large and the soil is productive of this crop. The average yield in the year 1912 was about 65 bushels per acre. The preceding year the yield was about 40 bushels per acre, which is nearer the average. A large area is devoted to wheat, which yields 20 to 27 bushels per acre. Some rye, buckwheat, and millet are grown.

Timothy and clover do well on this soil, ordinarily yielding from $1\frac{1}{2}$ to $2\frac{1}{2}$ tons of good quality hay per acre. Of timothy seed 7 or 8 bushels per acre and of clover seed from 1 to 2 bushels are obtained. Excellent bluegrass pastures are found, supplementing the hay crops during about six months of the year. Alfalfa is another forage crop which succeeds on the type. The crop is gaining in favor, but the acreage devoted to it is still small.

A common rotation valuable for use on the Miami silt loam covers a period of four years and consists of corn, oats, wheat, and clover.

Corn is frequently planted two years in succession, the remaining steps in the rotation being unchanged.

Corn is fertilized at the rate of 100 to 175 pounds per acre with a mixture analyzing 1.5 per cent nitrogen, 9 per cent phosphoric acid, and 4 per cent potash, though the formulas of different brands may vary slightly from this. For oats and wheat about 125 pounds per acre of the same mixture is applied.

The Miami silt loam is a mellow, friable soil of easy tillage. Its loamy structure allows the free circulation of air and moisture and the land is in condition to plant at a relatively early date. The internal drainage is not sufficiently free to make the soil unretentive of moisture.

Truck crops and fruit are grown for home consumption in all parts of the area. Apples, pears, cherries, grapes, and small fruits do well. Tomatoes for canning are grown to a limited extent and are found profitable.

The Miami silt loam is naturally deficient in organic matter. This should be supplied by plowing under legumes and other green crops and by returning to the soil the straw and other litter left from the harvested crops. Weeds are valuable for this purpose. Barnyard manure is, of course, the most valuable means of adding organic matter to the soil, and where an ample supply is available green manuring may be dispensed with. Alfalfa, clover, and other leguminous crops also help to maintain the nitrogen content of the soil through their ability to collect this constituent from the air.

Miami silt loam, flat phase.—The soil of the Miami silt loam, flat phase, consists of a whitish or light-gray to light-brown silt loam about 8 to 12 inches deep. The subsoil to an average depth of 25 inches is a light-gray to mottled yellow and gray silty clay. On handling the subsoil material the crushing of the iron concretions often gives an ocherous-yellow or brownish coloration. Below 25 inches the subsoil is a brown clay containing considerable sand and gravel, in places showing a reddish tint. This glacial drift material, containing gravel, stones, and bowlders, continues to an undetermined depth. Small iron concretions occur both on the surface and throughout the soil.

The soil as developed in this county is somewhat lighter in color or mottled and the drainage not so well established as in other areas.

The Miami silt loam, flat phase, occurs in the extreme eastern part of the county. It is extensively developed in the adjacent county of Boone and eastward.

The topography is nearly level to gently undulating. On this account and also on account of the dense subsoil, the natural drainage is not good. Tile drains and open ditches are common, but more

complete drainage systems would no doubt pay through increased crop yields.

The original forest growth on this phase consisted of oak, hickory, ash, and beech. Numerous groves and woodland pastures include these and other hardwoods.

The greater proportion of this soil is devoted to general farming. Corn produces a slow and uneven growth, but yields ordinarily from 25 to 35 bushels per acre. The yield of wheat ranges from 12 to 15 bushels, and of oats from 25 to 30 bushels. Timothy does very well on this soil, a better quality of hay being produced than upon the soils containing larger quantities of organic matter.

The Miami silt loam, flat phase, is deficient in organic matter. Stable manure is usually applied to the sod land, but this is not sufficient to maintain the supply. Little commercial fertilizer is used. The land would be much benefited by plowing under vegetable matter in the form of clover, rye, or peas.

A great improvement would result in this soil from deeper plowing and more thorough drainage to give better aeration. Deep-rooted crops such as the larger clovers and alfalfa will be found beneficial in this respect, as well as in maintaining the nitrogen content.

A variation of this phase occurs in the south-central part of the county, south of New Market and east of Browns Valley. The soil consists of a grayish-brown to gray or dark-gray silt loam about 6 to 8 inches deep. The subsoil is a mottled brown and gray, crumbly silt loam, which becomes gradually heavier and more compact as the depth increases, passing at 15 to 20 inches into heavy silty clay loam of a mottled yellowish-brown or yellow and gray color. The subsoil usually contains some small iron concretions, and these are also scattered over the surface and through the soil. This large area occupies nearly level country and is locally known as "Black Swamp." It is poorly drained and requires tiling or ditching for best results with crops. Evidences of glacial-lake origin do not seem to be strong enough, nor is the color of this soil dark enough, to warrant its classification as a member of the Clyde series, although it has been suggested by some geologists that Black Swamp represents the site of a former glacial lake.[1]

The soil of the "Black Swamp" area yields from 50 to 75 bushels per acre of corn, from 50 to 60 bushels of oats, and from 1 to 2 tons of hay. Very little wheat is grown, as it is not a profitable crop on this soil. During winter months it heaves badly, and if it survives the winter it usually lodges on account of the heavy growth of straw. The drainage needs to be improved, especially in case of the small

[1] See description Montgomery County, Ind., Geological Survey, Seventh Annual Report, 1875.

depressions. This will make the soil somewhat better suited for the production of the cereal crops.

Farm values on the Miami silt loam range from $100 to $150 an acre and on the flat phase from $125 to $150.

The results of mechanical analyses of samples of the typical soil and subsoil of this type are given in the following table:

Mechanical analyses of Miami silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
281319	Soil	0.1	1.2	1.6	3.8	5.5	74.1	13.4
281320	Subsoil	.3	1.3	2.0	5.0	5.0	63.1	23.6

CARRINGTON SILT LOAM.

The Carrington silt loam consists of a dark-brown to black silt loam, 10 to 15 inches deep. The subsoil is a brown to yellowish-brown silty clay loam, varying in places to a yellow silty clay, slightly mottled with splotches of gray and iron stains. The surface soil is usually free from stone and gravel, except on some low ridges and knolls. Bowlders are occasionally found scattered over the surface of both the undulating and level areas. In the deeper subsoil considerable stony material is found where the type occupies low ridges and knolls.

In Montgomery County the Carrington silt loam occurs only as a strip 1 to 5 miles wide extending across the northern edge of the county. This area represents the southern boundary of the extensive areas of this type occurring in upper Indiana. The area embraced within this survey is generally spoken of as prairie, although it is dotted with many islandlike groves.

The surface features vary from low ridges to areas of undulating and gently rolling topography. The type is derived from the weathering of the drift which deeply covers this region. Bowlders are especially numerous in this deposit south and southeast of Linden.

Nearly all of the Carrington silt loam has sufficient natural drainage, although some areas have been benefited by tiling.

The soil is devoted to general farming, to which type of agriculture it is very well suited. Practically all of it is used for agricultural purposes, a few woodlot areas being the exception.

The Carrington silt loam is an excellent corn and grass soil. The yield of corn ranges from 40 to 80 bushels per acre. Oats constitute an important crop, yields of 40 to 60 bushels per acre being usual. Wheat is not generally grown. The acreage planted to rye has increased in recent years. Timothy and clover are generally

sown together, giving yields of 1¾ to 2 tons per acre. Clover seeded alone is also grown, the first cutting for hay, and the second often for seed. From 1 to 2 bushels of seed per acre are obtained.

A rotation common on this type consists of two years of clover followed by corn, and then by oats, rye, or wheat. No commercial fertilizers are used, and the soil receives but little barnyard manure.

No attempt has been made to cultivate special crops on a commercial scale. Fruit, vegetables, and truck crops are grown for home consumption, and excellent yields are obtained. Farther north in this State sugar beets are being successfully produced on the Carrington silt loam. The scarcity of labor is the chief drawback to the production of this crop.

Farms on this type of soil are valued at $150 to $200 an acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Carrington silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
281309	Soil	0.3	2.3	3.4	7.9	6.8	62.9	16.3
281310	Subsoil	.3	1.8	2.5	6.2	6.1	65.1	17.7

CLYDE SILTY CLAY LOAM.

The soil of the Clyde silty clay loam to a depth of 8 to 15 inches is a black or dark-gray heavy silt loam or silty clay loam. The characteristic dark color is due to the high content of organic matter. The subsoil is a drab-colored, sticky, and plastic silty clay, which varies to a mottled yellow and light-gray color. In some cases in the lower part of the 3-foot section there is an appreciable quantity of sand mixed with the clay.

This type is the heaviest soil in the county and care is required in handling it. If worked when too wet, large clods form, which are subsequently pulverized with difficulty. Also when disturbed in this condition the soil is likely to run together and to assume a hardened condition on drying out, frequently cracking. A few areas were noticed, notably east of Darlington, where a small amount of sand has become mingled with the soil, rendering it more friable, easier to cultivate, and less liable to clod and bake. A good many patches were included with other types for the reason that they were too small to map.

The Clyde silty clay loam is generally distributed over the county, with the exception of the southern tier of townships, where only a few small patches occur.

The surface of the type is level or slightly depressed, and the natural drainage is poor. In some cases the soil occupies depressed areas of irregular shape in the uplands, where natural drainage is restricted. In texture these areas are practically the same as the dominant surrounding types. The soil represents mixed glacial and loessial material, which has been markedly influenced by poor drainage, favoring the accumulation of organic matter. There has been considerable washing in of silty material from adjacent higher land. In the low-lying country bordering streams and in some of the larger areas formerly swamps or ponds is found the heaviest phase of this type.

The greater part of the type is under cultivation, being drained by artificial means. There still remain areas which would be greatly benefited by more complete drainage systems. Along some of the streams areas too wet to cultivate are devoted to grass. There remain in the uplands some good-sized areas which support a heavy growth of oak, hickory, and elm.

This type is especially adapted to corn and grass. The yield of corn is from 40 to 80 bushels, the average being about 50 bushels per acre. Clover is grown but is frequently injured by heaving due to freezing and thawing. The yield is about 2 tons of hay per acre.

In favorable seasons oats produce 65 bushels, but 30 bushels per acre is about the average yield. Some rye is grown, and 15 bushels per acre is considered a fair average yield. In the usual rotation oats, with which clover is sown, follow corn. The acreage planted to wheat is small and for this crop only is commercial fertilizer used.

The price of the Clyde silty clay loam varies from $125 to $200 an acre, depending mainly upon the improvements in drainage.

FOX SILT LOAM.

The Fox silt loam consists of a light-brown silt loam to a depth of about 15 inches, where it is underlain by a brownish heavy silt loam or silty clay loam. Below this material, at an average depth of about 30 inches, sandy clay of a slightly reddish brown color is encountered. Beds of gravel from 4 to 7 feet below the surface insure good natural drainage. The surface is practically free from stone or coarse material.

The broad, high terraces north and west of Crawfordsville constitute the largest and most representative bodies of this type. These nearly level areas stand approximately a hundred feet above the channel of Sugar Creek. They represent material deposited by the stream when it was flowing at higher levels. The underlying gravel beds give evidence of having been laid down by swift currents, probably at the close of the glacial period. The soil covering of silty material may have been deposited contemporaneously with the silty

material of the Miami silt loam. Besides the areas along Sugar Creek, other bodies occur near Smartsburg and Shannondale on North Walnut Fork.

The Fox silt loam closely resembles the Miami silt loam, differing from that type chiefly in its topography.

Practically all the Fox silt loam is under cultivation most of it being devoted to the general farm crops. The type is easily cultivated and a loose, friable seedbed can be readily formed. It stands drought remarkably well. Corn will yield from 50 to 75 bushels per acre and oats 35 to 60 bushels, with an average of about 45 bushels per acre. Rye is grown to some extent, the average yield being about 25 bushels per acre. The Fox silt loam is an excellent clover and timothy soil. Clover seeded alone yields from 1½ to 3 tons per acre. The growing of alfalfa has not been attempted, but the soil is believed to be well suited to the production of this valuable hay crop.

West of Crawfordsville a large acreage of this soil is devoted to strawberries, lettuce, tomatoes, and other market-garden produce. The tomatoes grown are said to be superior in quality to those produced upon the more sandy soils.

In fertilizing the best results are obtained with a complete mixture containing 1.6 per cent nitrogen, 8 per cent phosphoric acid, and 6 per cent of potash. The use of stable manure, in connection with green manuring, is considered one of the best means of increasing and maintaining the productiveness of the soil.

Well-improved farms on the Fox silt loam bring from $100 to $150 an acre.

FOX SANDY LOAM.

The soil of the Fox sandy loam, to a depth of 12 to 15 inches, is a medium sandy loam to loam of a light to dark brown color. Fine gravel in limited quantities is found on the surface and through the soil and in places the soil approaches closely the texture of a fine sandy loam. On the higher terraces the texture is heavier, approximating a loam. Below the soil is a light-brown or yellowish-brown heavy coarse sandy loam or sandy clay, which contains considerable coarse sand and gravel. The gravel content increases with depth until at 3 to 5 feet a bed of nearly pure gravel is encountered.

The Fox sandy loam is not an extensive soil type in this county. It occurs along Sugar Creek and other streams as terraces (or second bottoms), all of which are of small extent. The largest area occurs along Sugar Creek.

The soil represents alluvial material deposited by the several streams when they flowed at higher levels than at present. Its origin is probably similar to that of the Fox silt loam.

On account of its porous texture and deep gravelly subsoil, the natural drainage of this type is good. The subsoil, however, is sufficiently compact and retentive of moisture to prevent damage to crops during ordinary periods of drought.

The Fox sandy loam gives good returns when planted to any of the crops grown in the area. Corn yields from 35 to 50 bushels, oats 30 to 50 bushels, wheat 15 to 20 bushels, and hay about 2 tons per acre. Alfalfa would doubtless do well on this soil. Small fruits and vegetables are grown to some extent, and where conveniently situated to market this type should be more extensively used for these crops.

Land of the Fox sandy loam type varies in price from $100 to $125 an acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Fox sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
281317	Soil	5.2	15.2	16.4	15.5	9.2	28.8	9.5
281318	Subsoil	5.8	17.5	14.4	13.2	8.4	31.8	8.8

GENESEE FINE SANDY LOAM.

The Genesee fine sandy loam is an unimportant type of soil, the three areas mapped covering 9,088 acres. It is found in the valley of Sugar Creek in the central part of the county and is derived from flood deposits of this stream. The soil is typically developed in the area northwest of Garfield, where the surface consists of a dark-brown fine sandy loam or loamy fine sand varying in depth from 10 to 20 inches and the subsoil of a light-brown sand, which usually becomes sticky below. In some cases the subsoil extends to a depth of 3 feet without important change, consisting of a rather loose sand, while in other areas it is composed of alternate sandy and silty layers.

The small patch south of Yountsville, which is really a fine sand, was included with this type on account of its small size. The largest area still farther south is a rather heavy fine sandy loam. That portion of the type lying east of Sugar Creek adjacent to the uplands is also noticeably heavy. The Genesee fine sandy loam occupies first bottoms and is almost entirely free from gravel, except near the stream channel. It is subject to occasional overflows, but crops are seldom injured by floods. The surface of the type is gently undulating and the areas are all well drained, except for overflows.

The Genesee fine sandy loam is productive and easily cultivated. It is an excellent soil for the growing of watermelons and well adapted to early garden crops. Corn is at present the chief product, and where the sandy loam subsoil occurs within 3 or 4 feet of the surface an average yield of about 40 bushels per acre is secured.

RODMAN GRAVELLY SANDY LOAM.

The surface soil of the Rodman gravelly sandy loam is a dark or light brown gravelly sandy loam or loam from 8 to 15 inches deep. The subsoil is a brownish sandy loam or loam containing varying quantities of gravel. Often the deep subsoil or substratum is a bed of gravel with comparatively little fine material. This is frequently used for surfacing roadbeds. On the crests of hills and ridges gravel and small stones are more abundant than on the lower slopes. Much of the gravel consists of limestone.

The Rodman gravelly sandy loam covers only a small proportion of the county, the largest area occurring as a ridge north of Darlington. Other areas form isolated hills and ridges in this section.

The type is usually associated with the Miami silt loam and frequently represents elevations occurring within this type from which the silty covering has been partially removed.

The material corresponding with the subsoil of the Rodman gravelly sandy loam outcrops in many places beneath the Miami silt loam in the bluffs and slopes along Sugar Creek and smaller streams. The two areas north of Yountsville occupy hills of considerable elevation overlooking the valley of Sugar Creek. The larger of these areas has suffered more from erosion than any of the others.

The topographic position and structure of this type permit rapid and thorough drainage. On the more elevated areas drainage is excessive and in seasons of light rainfall during the growing season the yields are reduced.

The Rodman gravelly sandy loam is devoted to general farming. Corn, oats, wheat, and rye produce fair yields. Clover does better, giving yields of 1½ to 2 tons per acre. On account of its high content of lime, this soil should prove a very valuable one for the growing of alfalfa.

STEEP BROKEN LAND.

The classification Steep broken land embraces all those areas which are so steep, rough, or stony as to be of little agricultural value. These include the steep, stony hillsides and bluffs along the streams and the land thoroughly dissected by numerous small streams flowing into Sugar Creek.

From a point east of Alamo on Sugar Creek much of the Steep broken land extending along this stream and its larger tributaries is

precipitous, and bare walls of rock frequently over 100 feet high are exposed.

Some small spots between the gullies included with the Steep broken land are cultivated, with fair crop yields. The growth is frequently uneven owing to varying depth of the soil. These areas represent other soil types, but are too small to be shown separately on a map of the scale used in the survey.

The irregular soil covering varies from a thin fine sandy loam on the slopes to a silty loam often as deep as 16 inches on the crests of ridges. In some places the buff or yellow silty clay subsoil is exposed. The soil of the more nearly level intermediate areas if mapped separately would be classed with the Miami silt loam.

This land should be largely used for pasturage and forestry.

MUCK.

Muck consists of decayed and decaying vegetable matter with which a small quantity of mineral matter is included. The material is black in color, fluffy when dry, and extends to a depth of 2 to 3 feet. Peat, or organic matter in a less advanced stage of decomposition, may be reached below the surface stratum of Muck. This mass of organic material rests upon a deposit of stiff, blue clay, which in turn is underlain by gray fine sand and gravel.

The largest area of Muck, and the only one of any consequence in the county, occurs about 2 miles east of Cherry Grove. It occupies what was formerly known as Lye Creek Swamp.

In character of material the Muck of the smaller areas is fairly typical, but the organic deposit is usually comparatively thin, sometimes being not more than 8 inches thick.

No attempt has been made to show upon the map numerous areas of Muck occupying less than 20 acres, which occur in the Clyde silty clay loam type of soil.

On account of the flat surface of the Muck areas the natural drainage is poor. The large area referred to has been reclaimed by means of large open ditches and is under cultivation. On the better drained areas corn is the principal crop grown, with yields of 50 to 75 bushels per acre, when fertilizer is applied at the rate of 125 pounds per acre. A mixture analyzing 8 per cent of potash and 8 per cent of phosphoric acid is used. Without fertilization corn yields about 20 bushels per acre. It is of inferior quality.

Commercial fertilizers containing a large percentage of potash salts are especially beneficial upon the Muck. A complete mixture analyzing 4 per cent nitrogen, 8 per cent phosphoric acid, and 10 per cent of potash is recommended where truck crops are grown on this land. From 500 to 1,500 pounds of this mixture per acre may be profitably applied.

Muck is adapted to the production of celery, lettuce, cabbage, carrots, onions, and potatoes. Throughout the Central States these crops, and in some localities peppermint, are extensively grown, and, considering the profits to be derived from these special crops, it is believed that the Muck of Montgomery County should be used in this way rather than in the production of the general farm crops.

MEADOW.

Areas of Meadow occur as narrow strips along nearly all the courses of the streams in the county, the exception being Sugar Creek. These areas are subject to overflow and represent the accumulation of water-transported material derived from the upland soils. The material varies widely in texture over small areas, the range being from sand to heavy clay loam. Satisfactory separation of the bottoms into types could not be accomplished, owing to the complicated arrangement of the areas. Some of the Meadow along the upper reaches of the streams represents poorly drained Clyde silty clay loam with a coating of Muck a few inches or more in thickness. As the streams increase in size and the channels deepen the areas of Meadow become broader and better drained, giving rise to a phase of predominately sandy loam texture. This condition prevails along all the larger streams.

The areas of Meadow are not suitable for cultivation, but afford good pasturage during the drier part of the summer. The forest growth, which is usually quite heavy, consists of oak, hickory, elm, sycamore, and other hardwoods.

SUMMARY.

Montgomery County is situated in the west-central part of Indiana and comprises 501 square miles, or 320,640 acres. The surface features vary. The northern part is gently rolling prairie, the east-central undulating, and the west-central part rolling to hilly. Below Yountsville the country bordering Sugar Creek and its tributaries is rough and uneven, being intersected by numerous small streams which occupy deep gullies and ravines.

Montgomery County was organized in 1823, and Crawfordsville was founded about this time. It is the county seat and at present has a population of about 10,000.

The main annual rainfall is 36.43 inches. The absolute maximum temperature is 105° F., and absolute minimum —33° F. at La Fayette and —24° F. at Veedersburg. The average date for the last killing frost in spring is April 27 and for the first in fall October 21.

The county is well provided with steam, electric, and wagon roads, which afford ample transportation facilities.

Drainage of the county is principally through Sugar Creek. The main tributaries are Walnut Fork, Lye, Black, Offield, and Indian Creeks. The branches of Coal Creek drain the northwestern portion directly into the Wabash, and the southern and southeastern parts are drained by the Raccoon Creeks.

General farming is the type of agriculture followed in Montgomery County. Corn, oats, wheat, clover, and timothy are the chief crops. Live stock is not raised extensively.

Alfalfa, an ideal forage crop and soil renovator, has been successfully grown to a small extent. More attention should be given to this crop and to clovers.

The average size of farms is about 80 acres. About 60 per cent of the farms are operated by the owners. Many retired farmers live in the towns and rent their farms.

The value of the farm land ranges from $15 to $50 for Steep broken land to $100 or $150 for "sugar-tree land" and other light-colored soils, and from $150 to $200 or more for "black land."

Ten types, including Steep broken land, Muck, and Meadow, are mapped. These have all been derived from glacial material. The light-colored types need organic matter. The dark soils, having remained in a swampy or poorly drained condition for a considerable period, contain more humus.

Silt loams cover the greater part of the county, the Miami silt loam being the dominant type. It is well suited to all the crops grown in the county. A flat phase of the type occurs. It is a good grass soil and considered fair for general farming. The "Black Swamp" area is occupied by one of the best corn soils in the country.

One Carrington soil, the silt loam, is found. This is a strong soil, containing a high percentage of organic matter and well suited to general farming. It is the prairie soil, with an undulating to rolling surface, and the highest priced soil in the county.

The Genesee series is represented by one type, a fine sandy loam, which occupies the flood plains of Sugar Creek and the other streams of importance. It is devoted principally to the culture of corn and grass. Melons and garden truck are grown in some localities.

The Fox series occupies the terraces. The sandy loam is found on the lower terraces; the silt loam on the higher. The latter closely resembles the Miami silt loam. Both the Fox soils are good general farming types, and in some places are devoted to small fruits and market gardening.

The Rodman gravelly sandy loam is of small extent. It occurs in morainic country. It is a fairly good soil for general farm crops, though somewhat droughty.

Steep broken land permits of some patchy farming, with fairly good yields, but the greater part of the type is unfit for cultivation.

Muck has been drained and when properly cared for and fertilized produces abundantly of corn and grass. Special crops, such as onions, celery, carrots, and cabbage should prove remunerative.

Meadow land is usually too wet for cultivated crops and is best suited to pasturage.

○

[PUBLIC RESOLUTION—No. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

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U.S. DEPT. OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP
INDIANA
MONTGOMERY COUNTY SHEET

STATE OF INDIANA
DEPARTMENT OF GEOLOGY
EDWARD BARRETT, STATE GEOLOGIST

SOIL PROFILE
(3 feet deep)

Carrington silt loam — Sil / Sic
Miami silt loam — Sil / Sicl / Sc or Cl — Flat phase
Rodman gravelly sandy loam — Sl / Sl
Fox sandy loam — Sl / Sl to Sc
Fox silt loam — Sil / Sicl / Sc
Clyde silty clay loam — Sil / Sic
Genesee fine sandy loam — Fsl to Lfs / S to Ls

LEGEND
S Sand
Ls Loamy sand
C Clay
Sic Silty clay
Fsl Fine sandy loam
Sicl Silty clay loam
Cl Clay loam
Sil Silt loam
Sl Sandy loam
Sc Sandy clay
Lfs Loamy fine sand

LEGEND
Carrington silt loam — C
Miami silt loam — Msl — Flat phase
Rodman gravelly sandy loam — Rs
Fox sandy loam — Fl
Fox silt loam — Fs
Clyde silty clay loam — Cs
Genesee fine sandy loam — Gf
Steep broken land — S
Muck — Mu
Meadow — M

R6W R5W R4W R3W
T20N T19N T18N T17N
TIPPECANOE CO. MONTGOMERY CO. BOUNDARY LINE CLINTON CO. MONTGOMERY CO. BOONE CO.
PARKE CO. FOUNTAIN CO. MONTGOMERY CO. BOUNDARY LINE BOONE CO. MONTGOMERY CO. HENDRICKS CO.
MONTGOMERY CO. PARKE CO. PUTNAM CO. BOUNDARY LINE

COAL CREEK · MADISON · SUGAR CREEK · WAYNE · FRANKLIN · RIPLEY · UNION · WALNUT · BROWN · SCOTT · CLARK

New Richmond · Linden · Kirkpatrick · Wingate · Ellendale · Round Hill · Cherry Grove · Darlington · Bowers · Waynetown · Wesley · Wesley Chapel · Manchester · Garfield · Shannondale · Smartsburg · CRAWFORDSVILLE · Trout Station · Yountsville · Mace · Beckville · Limsburg · Alamo · Whitesville · New Ross · New Market · Shades · Pawnee · Ladoga · Browns Valley · Lapland · Wayeland · Parkersburg · Forest Home

North Fork Coal Cr. · Turkey Run · East Fork Coal Cr. · Sugar Creek · Black Creek · Indian Creek · Rattlesnake Creek · Offield Creek · Raccoon Creek · Little Raccoon Creek · Cornstalk Creek · Haw Creek · Big Raccoon Creek · Old Potato Creek · Walnut Fork · South Fork Walnut Creek · Hazel Creek · Slough

TOLEDO, ST. LOUIS AND WESTERN RAILROAD · CHICAGO, INDIANAPOLIS AND LOUISVILLE RAILROAD · PENNSYLVANIA RAILWAY · TERRE HAUTE, INDIANAPOLIS AND EASTERN TRACTION CO. · CLEVELAND, CINCINNATI, CHICAGO AND ST. LOUIS RAILWAY · CRAWFORDSVILLE AND SOUTHERN TRACTION LINE · INDIANA, ILLINOIS AND IOWA RAILWAY · CENTRAL INDIANA RAILWAY · CHICAGO, INDIANAPOLIS AND LOUISVILLE RAILWAY · INDIANAPOLIS AND CINCINNATI RAILWAY · INDIANAPOLIS AND VINCENNES RAILROAD · CHICAGO, INDIANAPOLIS AND LOUISVILLE RAILWAY

FORD · COUNTY FARM · PINE BLUFF BRIDGE

J. E. Lapham, Inspector in Charge Northern Division
Soils surveyed by Grove B. Jones of the
U.S. Department of Agriculture and C. H. Orahood
of the Indiana Department of Geology

Scale 1 inch = 1 mile
1 ½ 0 1 2 3 4 Miles

A. Hoen & Co. Lith. Baltimore, Md.

Field Operations
Bureau of Soils
1912